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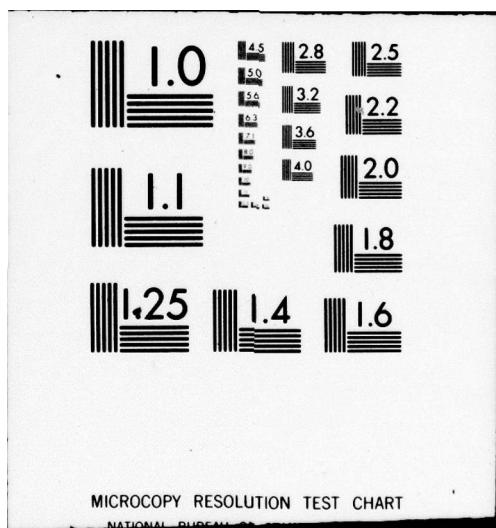
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SOFTWARE FOR A UNIFORM ELECTRONIC DIGITAL COMPUTER SYSTEM

By

Wladyslaw Klepacz



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Software for a Uniform Electronic Digital Computer System

W. Klepacz

Four operational systems are presented for individual models of a Uniform System of Electronic Digital Computers (JS EMC): OS-10 for the EC-1010, MOS (Small Operational System) for the EC-1020A and DOS and OS for the remaining models. Technical service programs and packets of application programs are discussed.

From the consumer's point of view the fundamental factor integrating individual models of a Uniform System is, besides external equipment, its software.

Like equipment, this software determines the developed system, whose chief purpose is the creation of maximum adjustments for the consumer in the area of preparing applications and uses of concrete computer configurations.

In particular, software allows:

- a reduction in work absorbing capacity and an increase in the efficiency of activities connected with the preparation, setting in motion and execution on the computer of the consumer's programs,**
- raising the overall level of utilization of the computer kit,**

- solving the problems in the area of practically all types of digital computer applications.

The software of Uniform System computers includes:

- operational systems
- kits for technical service programs
- packets for applications programs.

OPERATIONAL SYSTEMS

In the software of Uniform System computers there are four operational systems, namely:

- Operational System OS-10 for the JS 1010 model
- Small Operational System MOS for the JS 1020A model (Czech.)
- Disk Operational System DOS for models JS 1020, 1030, 1040 and 1050 with limited working storage capacity (64-128 k bytes)
- Operational System OS for models JS 1020, 1030, 1040, 1050 and 1060 with large working storage capacity (128-2,000 k bytes).

The above operational systems ensure the efficient functioning of individual Uniform System models regardless of their configuration and character of solved problems.

The modular structure of the operational systems of a Uniform System

and the existence in their structure of generating media allow for the automatic readjustment of these systems to concrete configurations of the equipment and the character of application. The independence of the programs from the characteristic of attached external equipment ensures the element of the operational system called the control data system. It releases the programmer from the necessity to input changes to the programs in the case of a change in equipment.

Operational systems of a Uniform System are built as "open" systems in the area of the possibility of expanding their action in new equipment, new fields of application and new programs. There also exists the possibility of widening the range of the functional possibilities of the same operational system.

A high rate of production of the computer kit is ensured by:

- automatic input of problems and their inclusion in the realization of problems previously input
- multiprogram operation, ensuring optimal use of all equipment
- existence of various means of control and diagnosis of correction of equipment operation.

An increase in work output of programmers and the simplification of the programming activities themselves in relation to various fields of applications ensure the numerous universally used programming languages which exist

in the operational systems of the Uniform System (ALGOL, FORTRAN, PL/1, COBOL, RPG, ASSEMBLER).

Operational systems of a Uniform System ensure the possibility of single-program, multiprogram, multiprocessor and multicomputer service in real-time and with time sharing. All the types of service mentioned can be realized both in local processing conditions as well as in remote processing systems through telecommunication lines. In operational systems of a Uniform System there are also provided standard solutions for service for a whole gamut of various external equipment: equipment for the input and output of data on punched cards and tapes, tape and disk storage, screen monitors (graphoscopes and alphascopes), drawing and printing equipment, document readers and data transmission equipment.

STRUCTURE OF OS AND DOS OPERATIONAL SYSTEMS

The basic operational systems of Uniform System Computers are the OS and DOS systems designed for all common models (JS 1020 - JS 1060).

The DOS operational system is the most efficient for use in models having lower numeration. It is designed chiefly for processing economic type information (information for management needs).

The OS operational system in comparison with the DOS system is more

developed and more complex and requires greater storage working capacity and greater processor activity speed. From the viewpoint of applications the OS system is an operational system having universal significance.

The overall structure of the above mentioned DOS and OS operational systems is given in Figure 1. From it we can conclude that the basic component parts of these systems are the management programs and processing programs. Management programs direct the activity of processing routines and make available to them the necessary means of realization. There exist three fundamental levels of management: data management, problem management and operations management.

Data management programs realize efficient planning and direction by an exchange of information between working store and external equipment ensuring the user flexible methods of organization and access to the data regardless of the type of equipment.

The fundamental program on the level of controlling tasks is the supervisor program. To the tasks of this program belong: the working out of interruptions, realization of recalls to working store, transfer of control by operation modules, completion of operations, and the like. The structure, functions and content of the supervisor program depend on the kind of program control system, computer model and character of operations, and connected

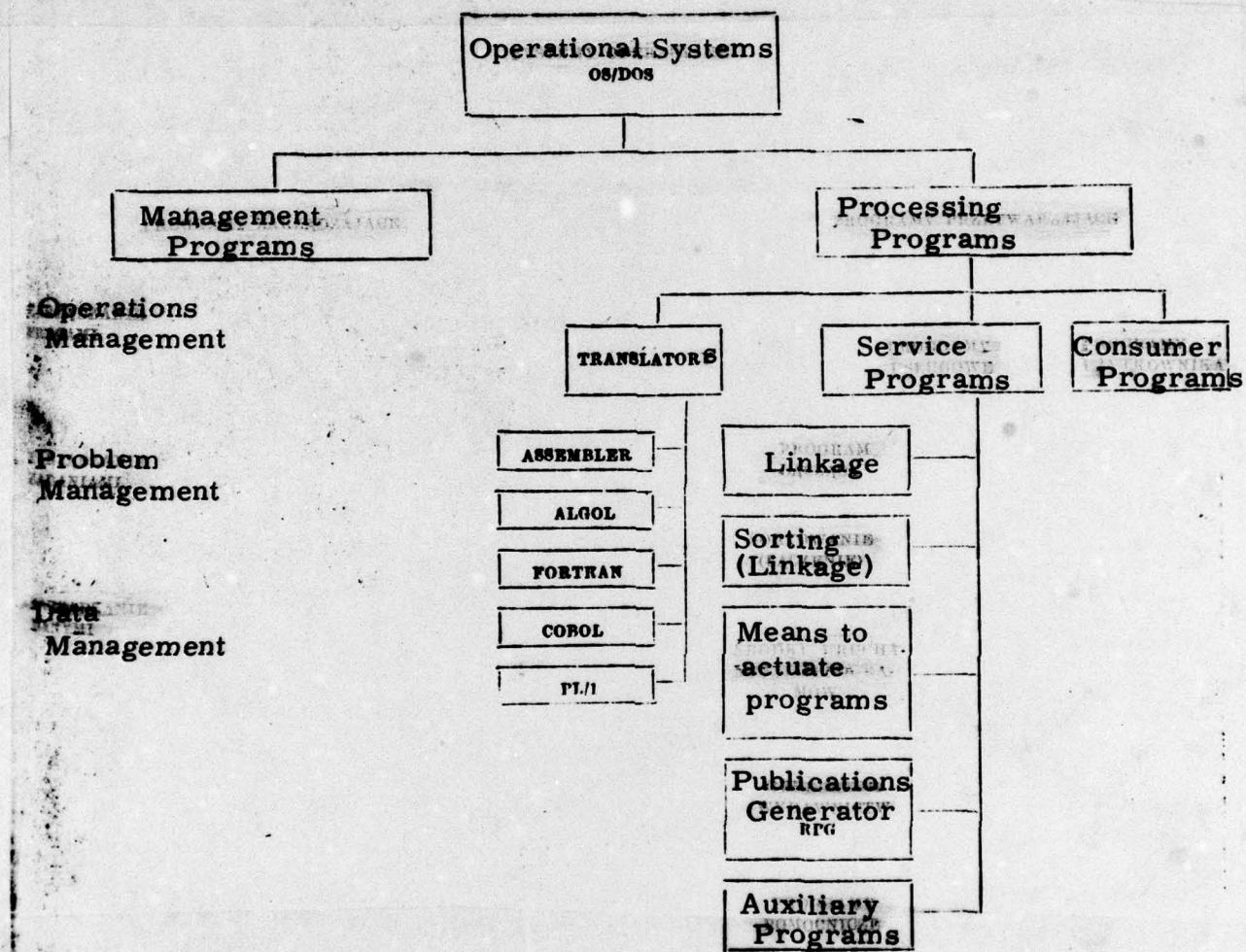


Fig. 1. Overall structure of DOS and OS operational systems.

with this, they are each defined during the generation operation of the operational system.

Operations management programs ensure the continuous processing of a program sequence without the operator's intervention. This process includes the execution of calculations necessary the given operation, the organization of the sequence of performance of operations, allocation of input/output equipment, transfer of control to the supervisory program, and the like. Relatively simple operations remain for the operator (e. g., loading magnetic tape spools).

The translators of the basic programming world languages (ASSEMBLER, ALGOL, FORTRAN, COBOL, PL/1) and service programs belong to the processing programs.

Service programs serve to realize functions often met during data processing, e. g., editing, linking and other operations performed on programs and data. Service programs include, among others, linkage editor, sorter, linking and a group of auxiliary programs. The linkage editor tabulates and formulates separately assembled or compiled modules or segments of programs in the form of a program ready for input and completion.

Sorting and linking programs put in order and link records of fixed or variable length in an ascending or descending sequence.

Auxiliary programs realize data transfer between various external equipment, organization and modification of programs in system libraries, change data structure, and enter data or programs, and the like.

As mentioned already, the DOS system ensures the necessary service efficiency of smaller models and equipment configurations of the Uniform System. It has a relatively simple structure that can be easily modified, a developed system of uncovering errors and a large collection of translators of the basic programming languages. It ensures the realization of multi-program operations (for programs) and remote data processing through subscriber terminal equipment and telecommunication lines. The DOS system is characterized by a great flexibility of use, expressing itself by the possibility of simultaneous use of the disk and tape store with relatively small working store capacity, of remote processing control and intense data input, as well as by a great operational efficiency costing a small processor load through the control program.

Compared with the DOS the OS operational system has broader possibilities in the field of multiprogrammability (up to 15 programs) and of managing data collection with complete independence of the type of external equip-



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ment, has the property of dynamic memory allocation and multiprogram operation on a priority basis. Besides this system the OS creates the possibilities of using more developed and at the same time, efficient translators of programming languages and service programs, receiving extensive information for each program during multiprogram use and considerable simplifications during operations actuating the programs.

TECHNICAL SERVICE PROGRAMS

The group of Uniform System technical service programs include

programs operating under the supervision of the operational system and programs independent of the system.

Depending on their purpose, technical service programs are divided into:

- actuating programs
- control programs
- localizing (diagnostic) programs.

Actuating programs were developed distinctly for processors, working store, external memory channels and input/output equipment. They are programs operating independently of the operational system. They serve to control the operation of the above mentioned types of equipment during their technical actuation.

Control and localizing (diagnostic) programs are used to check the accuracy of operation of the entire digital computer configuration and to detect and locate failures. These programs operate under the supervision of a special program input to the composition of the monitor's operational system. The monitor ensures the linking with the computer operator, the realization of interruptions, and print out of error lists.

APPLICATION PROGRAM PACKETS

Application program packets are functionally closed groups of programs which serve to solve definite calculative and data processing problems which often occur in practice. Particularly in the field of management problematics they permit the consumer relatively easy and many times less work absorbing capacity preparation and actuation of data processing subsystems by a method of combining and adapting ready programs adaptive to the realization of many different variants of solutions.

Application program packets determine the fundamental element ensuring rapid use by consumers of typical equipment sets of individual models of Uniform System computers in various service systems. These packets, moreover, facilitate for the consumers the rapid transfer and functional expansion of systems and programs used up to now in second generation computers. Use of the packets also gives the consumer the possibility of linking to them their own programs, which take into consideration specific solutions, which are not provided in the packets from the viewpoint of sporadic occurrence. Application program packets constitute the software element of Uniform System Computers, which undoubtedly will develop very dynamically as a consequence of the quantitative increase of applications, and following that—a collection of practical experiments necessary for their further development.

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